



Accelerating solutions for highway safety, renewal, reliability, and capacity

Regional Operations Forum

Traffic Incident Management / Emergency
Operations / Planned Special Events /
Work Zones

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

Session Focus

- Managing “events”
 - Conditions that are outside “normal” or ideal
 - Disruptions to the system
- Two basic categories of events – planned and unplanned

Planned	Unplanned
<ul style="list-style-type: none">- Special events- Work zones (most)	<ul style="list-style-type: none">- Traffic incidents- Emergency situations- Weather events

Effects of Events

- Events cause non-recurring congestion
- Create conditions that are:
 - Changing over time
 - Less predictable
 - Unexpected to system users
- Infrastructure investments help but are not full solutions

Managing Non-Recurring Congestion and TSMO

Managing and preparing for these events is an operational philosophy that supports and becomes a foundation for transportation system management and operations (TSMO).





Accelerating solutions for highway safety, renewal, reliability, and capacity

Traffic Incident Management (TIM)

Traffic Incident Management (TIM)

- TIM consists of a planned and coordinated multidisciplinary process to detect, respond to, and clear traffic incidents so that traffic flow may be restored as safely and quickly as possible
- Effective TIM reduces the duration and impacts of traffic incidents and improves the safety of motorists, crash victims, and emergency responders



National TIM Program Vision...

Through continuous and enhanced planning and training of all TIM personnel:

1. Reduce or eliminate responder and motorist injuries and fatalities
2. Promote rapid incident clearance, thereby reducing traffic congestion and vulnerability
3. Develop or enhance local TIM Programs that ultimately benefit corridors, regions, and states
4. Measure performance that demonstrates improved TIM responses and programs over time
5. Emphasize TIM as a system operations “core mission” for all responders

The Evolving Business Case: Why TIM?

1. Safety

- Victims
- Responders
- Travelers



The Evolving Business Case: Why TIM?

2. Cost

	Cost of Crashes		Cost of Congestion	
	Total	Average Per Person	Total	Average Per Person
2005 National	\$164.2 billion	\$1,051	\$57 billion	\$430
2009 National	\$299.5 billion	\$1,522	\$97.7 billion	\$590

Source: AAA Crashes vs. Congestion, What's the Cost to Society? - Nov. 2011

Why TIM?

In California, since 2010, 26 responders have been killed in the line-of-duty while responding to incidents on California's highways:

Law Enforcement - 9 Officers Killed

Ken Collier, San Diego Sheriff – Feb 28, 2010
Phillip Ortiz, CHP – June 22, 2010
Justin McGrory, CHP – June 27, 2010
Brett Oswald, CHP – June 27, 2010
Ryan Bonaminio, Riverside PD – Nov 7, 2010
Brian Law, CHP – Feb 17, 2014
Juan Gonzalez, CHP – Feb 17, 2014
Kostiuchenko, Ventura Sheriff – Oct 28, 2014
Nathan Taylor – March 13, 2016

Fire Personnel - 2 Responders Killed

David Ratledge – Feb 29, 2012
Christopher Douglas – Jul 5, 2013

EMS – 2 EMS Personnel Killed

Esteban Bahena – April 1, 2010
Douglas Odgers – May 8, 2011

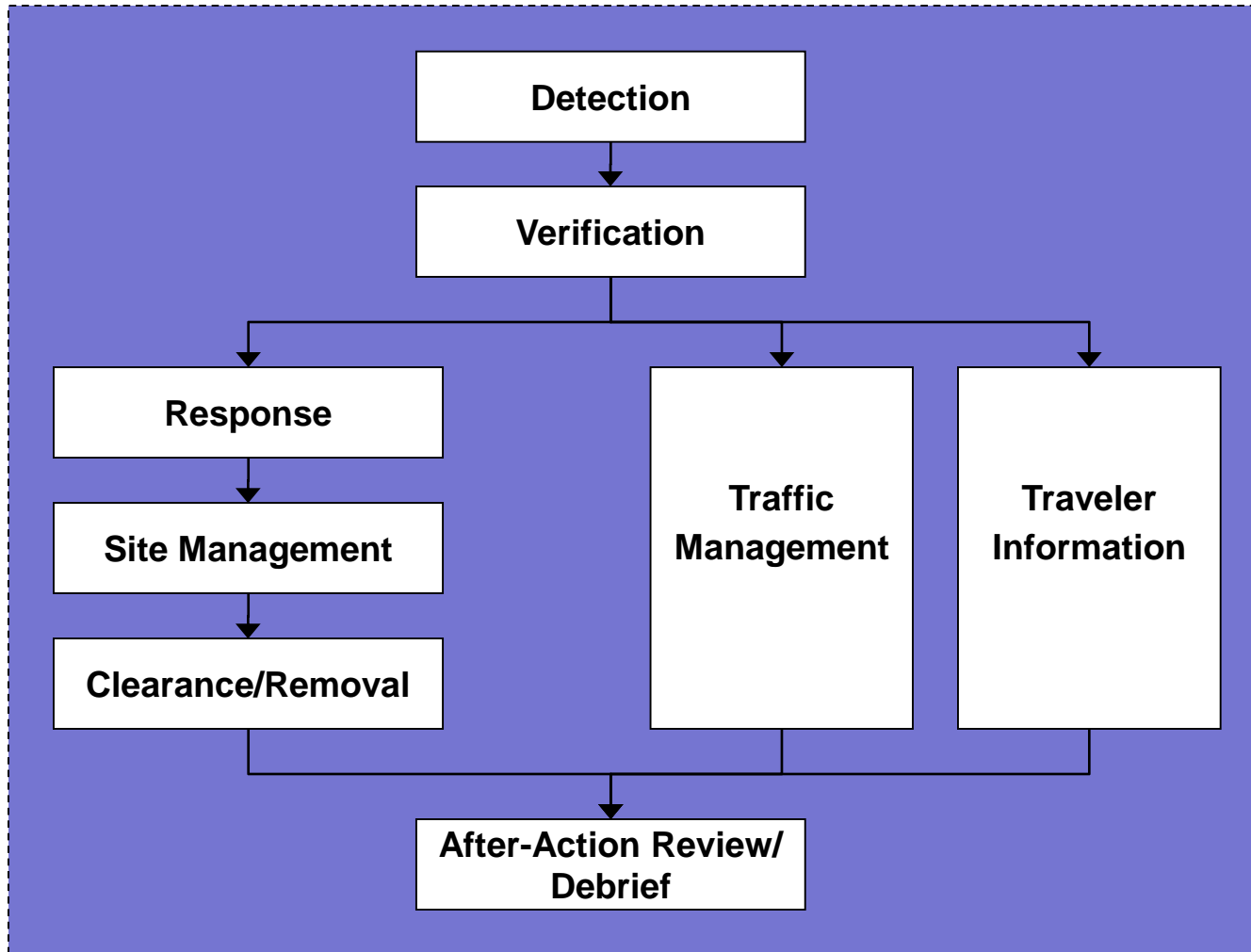
Towing - 10 Tow Operators Killed

Michael Sanders – Feb 7, 2011
Christopher Tatro – Dec 17, 2011
David Robinson – Mar 20, 2012
Jesus Salcedo – Mar 30, 2012
Shaun Riddle – Dec 8, 2012
Faapuna Manu - Dec 8, 2012
Ronald Carver – Feb 11, 2013
Christopher Gladden – July 28, 2013
Ricardo Valdez – January 28, 2014
Jabar Issa – January 17, 2015

Caltrans Maintenance – 4 Workers Killed

Gary Smith – Nov 7, 2010
Stephen Palmer – May 4, 2011
Jaime Obeso – June 7, 2011
Richard Gonzalez – June 20, 2011

TIM Process

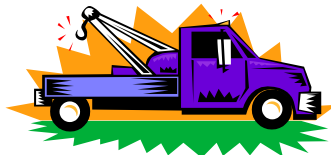


National Unified Goal for TIM

The NUG for TIM is:



Responder Safety



Safe, Quick Clearance

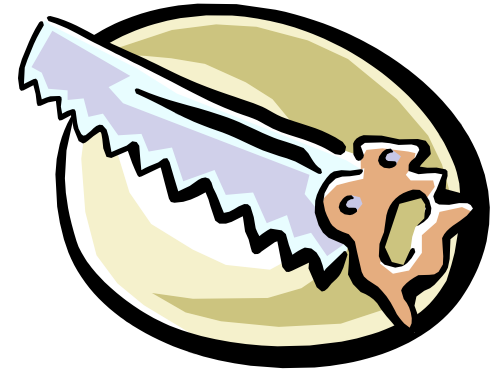


Prompt, Reliable, Interoperable
Communications

NUG Strategies

Cross-Cutting Strategies:

1. TIM Partnerships and Programs
2. Multidisciplinary NIMS and TIM Training
3. Goals for Performance and Progress
4. TIM Technology
5. Effective TIM Policies
6. Awareness and Education Partnerships



TIM at a National Level

- National Traffic Incident Management Coalition (NTIMC)
 - Formed in 2004
 - multidisciplinary partnership of national public safety and transportation organizations
 - Sets and supports a national agenda for TIM
- A national **vision** – The National Unified Goal (NUG) for TIM
- International Association of Chiefs of Police (IACP)
- National Fire Protection Association (NFPA) TIM Standards
- International Association of Fire Chiefs (IAFC)
- International Association of Fire Fighters (IAFF)
- U.S. Fire Administration

• Additional information can be found at: <http://timcoalition.org>

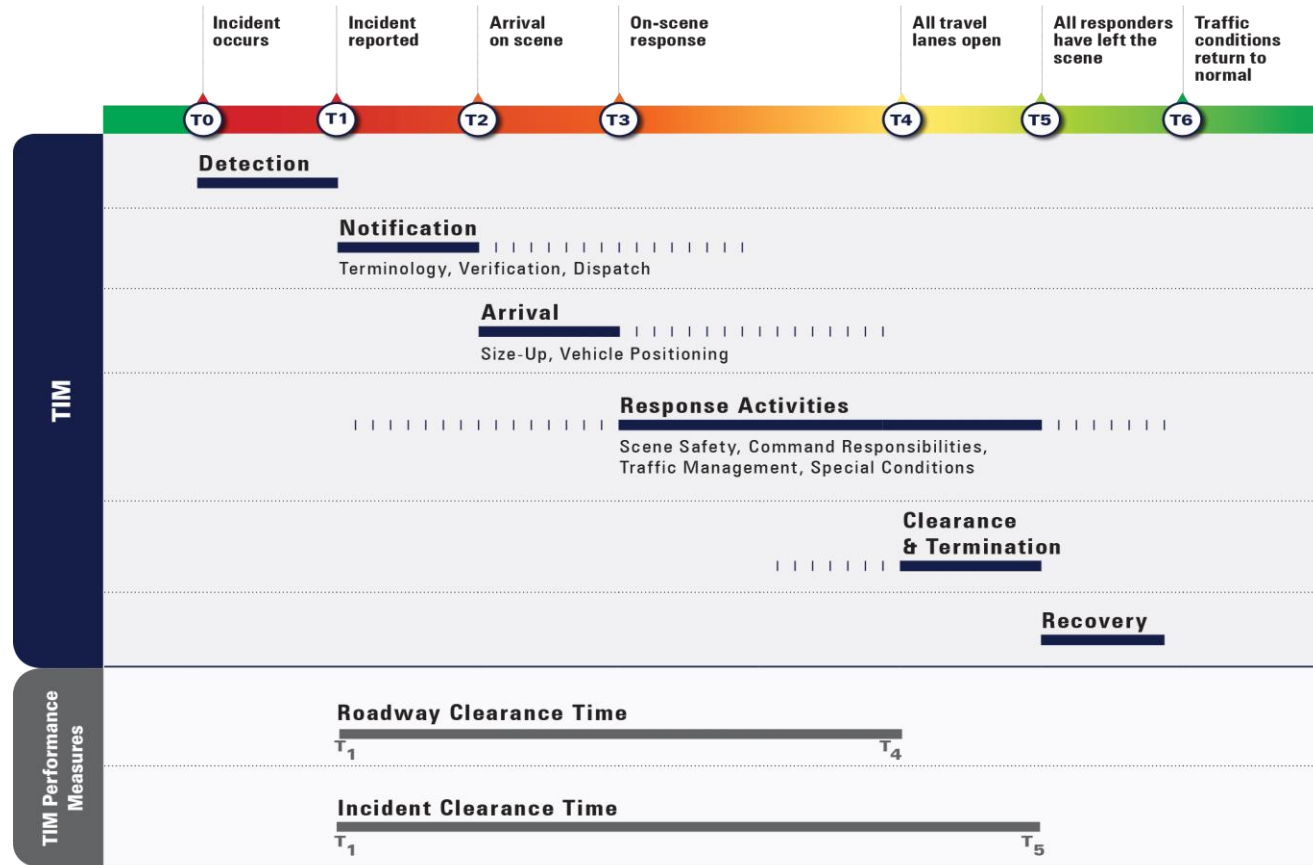
What is a TIM Program?

- The goal of a TIM program is not to create a response, but rather to allow for a more effective, efficient response for all responding agencies
- Incident response in and of itself does not entail the same degree of coordination, planning, and conscious effort that is more broadly required for an effective, comprehensive TIM program
- TIM programs and associated committees and/or task forces are sustained and ongoing

Discussion Item

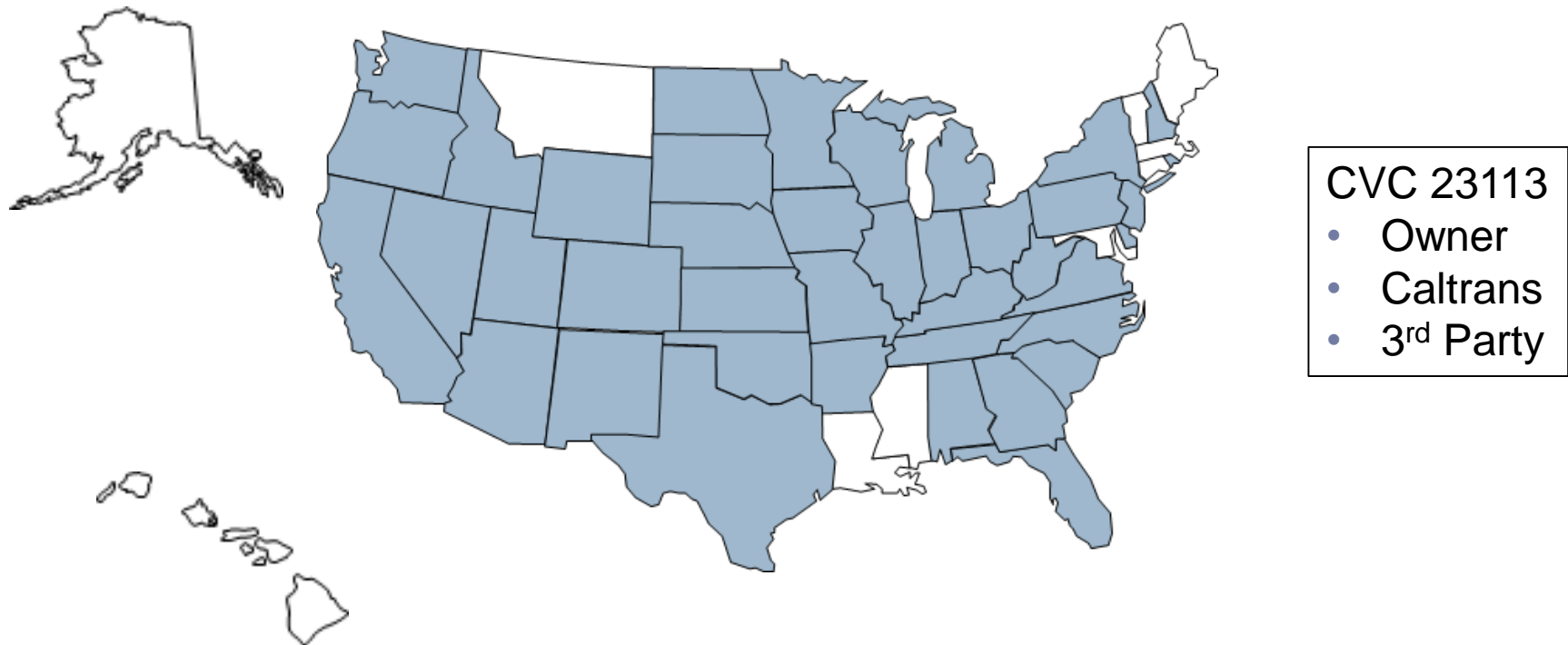
- What are your current activities and program for TIM?
- Who if any are identified as dedicated TIM staff?
- What has been a significant challenge to your program? How are you addressing that challenge?
- Who should be included in your TIM discussions?

Incident Timeline: What Does Safe Quick Clearance Mean?



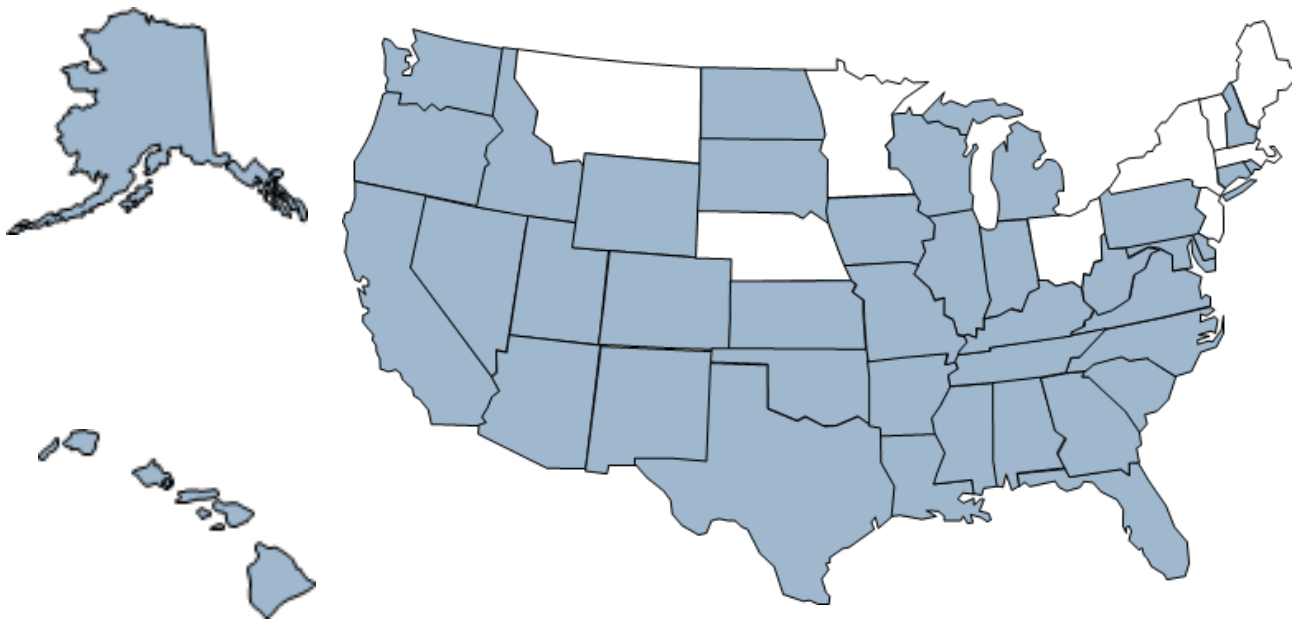
Authority Removal or “Remove It” Laws

These laws provide authority (and immunity from liability in general) for designated public agencies to remove abandoned vehicles and spilled cargo from the roadway to restore traffic flow



Driver Removal or “Move It” Laws

Require motorists involved in minor crashes (where there are no serious injuries and the vehicle can be driven) to move their vehicles out of the travel lanes to the shoulder or other safe area before initiating the exchange of insurance information, or while awaiting the arrival of law enforcement and/or a tow truck



CVC 20002

- Misdemeanor
- 6 mo. County jail
- \$1000 fine



SR61(CA)

Freeway Service Patrol

- Trained personnel using specially equipped vehicles to:
 - patrol congested highways,
 - search for and respond to traffic incidents, and
 - provide motorist assistance
- Recognized as one of the most effective TIM strategies
 - often play a role in all stages of the TIM process
- One of the most valued services by the public
- Benefit-to-Cost Ratio (Davies 2016)
 - San Diego- 5:1



High-Level TIM Training Framework and Tiered TIM Focus Areas

Tier 1:

Training for Traffic Incident Responders (SHRP 2 L12)

Tier 2:

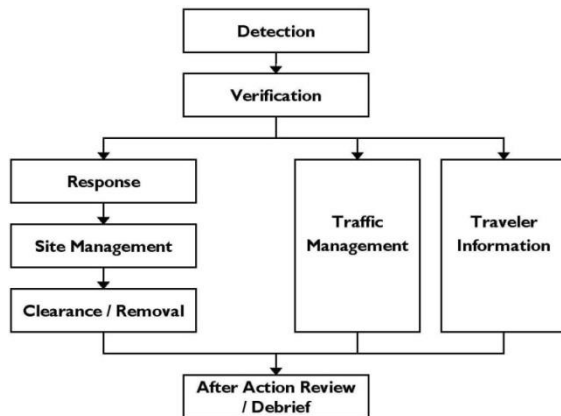
Advanced TIM Workshop (for Mid-Level Managers)

Tier 3:

Executive Level Briefings (for Decision Makers)

Response Focus

- TIM Process

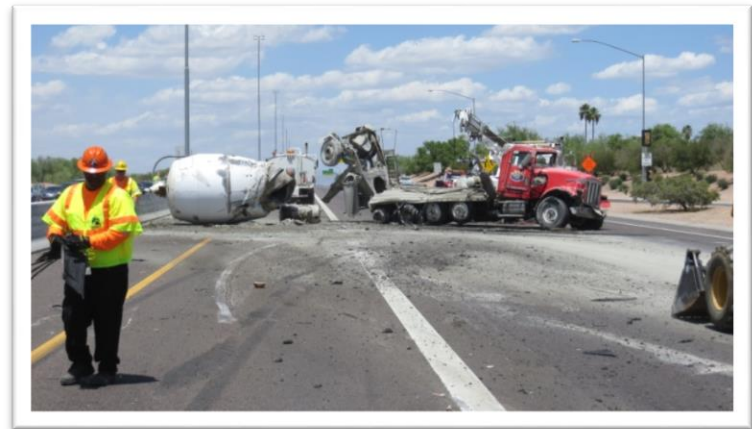


Program Focus (Committee/Task Force)

- Relationships
- Needs Assessment
- Training
- Performance Evaluation
- Asset Management
- Contracting
- Administration & Staffing
- *Finance/Budget*

Traffic Incident Management Training

- **Training program** through FHWA and SHRP2
 - **Multi-disciplinary training** with national curriculum
 - Develops **cadre of emergency responders** who work together at an accident scene in a coordinated manner
 - **Improves safety** to responders and travelers
- Developed **by responders for responders**



SHRP-2 TIM Training

Training in California:

- 13 1.5-day “Train-the-Trainer” courses – 455 instructors
- 549 4-hour responder courses – 10,000 responders trained
- Web-based version – 2,536 responders Trained
- 13,000 total responders trained in CA
- Institutionalizing in academies:
 - CHP Academy
 - Caltrans Maintenance Academy (NEMO)
 - Towing rotation/FSP

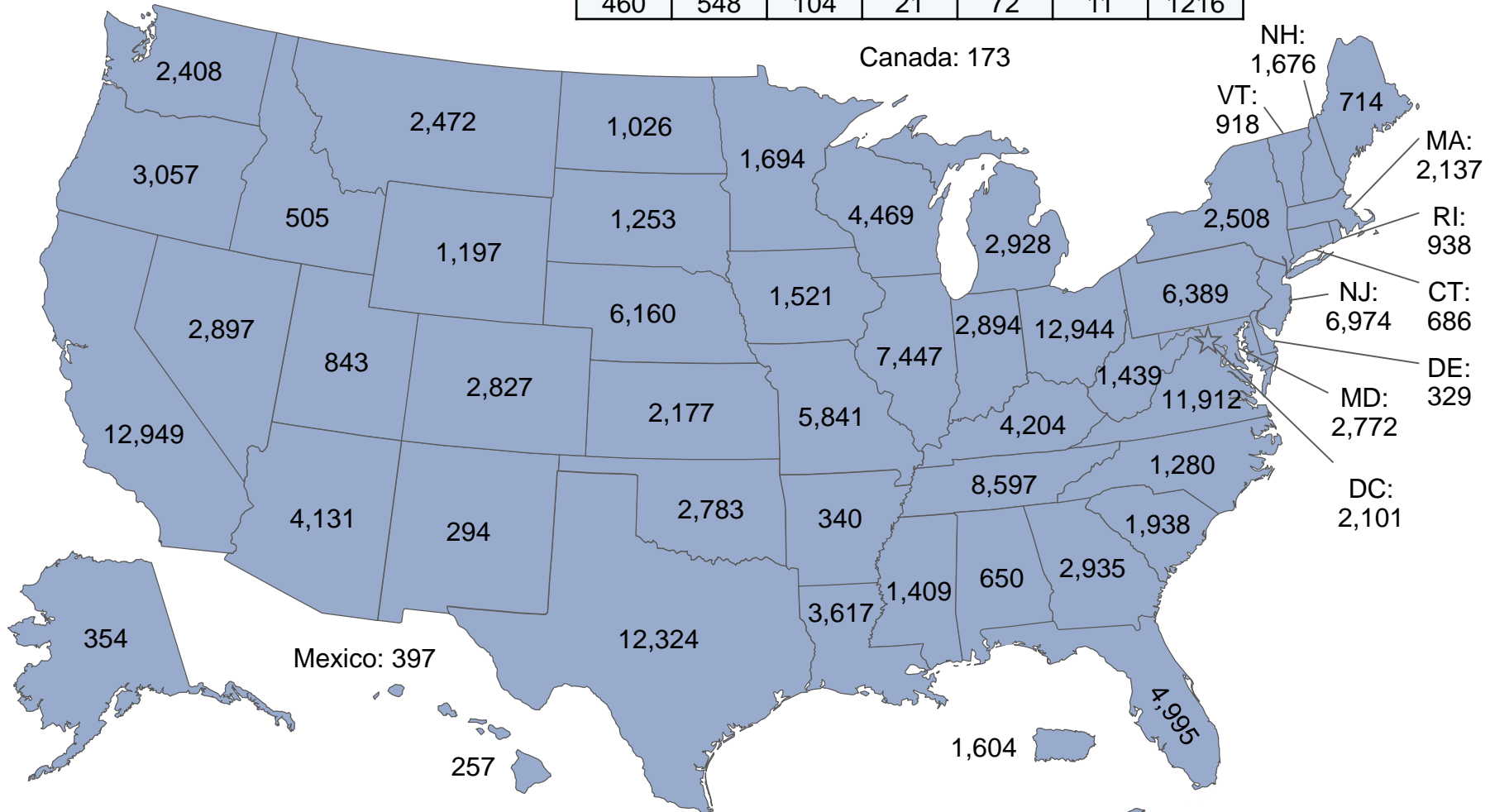


TIM Training Program Implementation Progress

Total Trained = 173,284 as of April 4, 2016

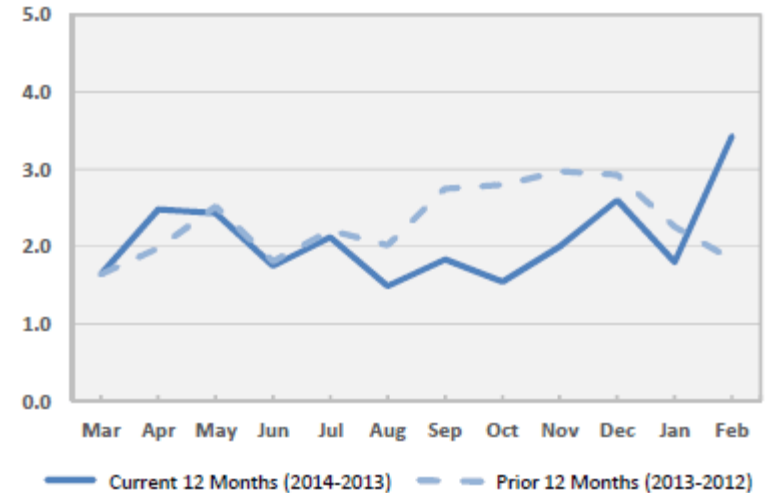
San Diego Region: 63 classes:

Law	Fire	Tow	EMS	DOT	Other	Total
460	548	104	21	72	11	1216



Measuring Success

- What Gets Measured Gets Performed...
 - Quantifying TIM benefits will advance program continuity:
- Builds critical mass for program support from managers and elected officials:
 - Supporting what works
- Ensures buy-in from diverse stakeholders:
 - Multiple agencies, coordinated response
- Supports allocation of technical and budget resources



TIM Performance Measures

- “Roadway” Clearance Time
 - Time from first record of an incident by a responsible agency to all lanes being open to traffic - **MIDB**
- “Incident” Clearance Time
 - Time from first record to time last responder leaves scene
- Secondary Crashes
 - Crashes beginning with the time of detection of the primary incident
 - within the incident scene or
 - within the queue, including the opposite direction

Discussion: Improving Traffic Incident Management

- How to move to the next level?
- How to involve key stakeholders?
- How to sell the program internally?

TIM Take Aways

- Have you developed a TIM “program”?
- Have you included all of the critical stakeholders in your TIM activities?
- Does FSP need to be expanded?
- Are you familiar with the NUG? And the NUG Framework?
- Have you taken advantage of the TIM training available?
- Have you done a TIM self assessment?



Accelerating solutions for highway safety, renewal, reliability, and capacity

Emergency Operations

Types of Emergency Events

- Hurricanes / Tornadoes
- Floods
- Heavy rains
- Earthquakes
- Wild Fires
- Winter Weather / Snow and Ice Storms
- Homeland Security / Catastrophic Infrastructure emergencies



Common Characteristics of These Events

- Large scale impact
- Can happen anytime, often without warning
- Transportation is critical to effective response
 - Whether transportation infrastructure is affected or not



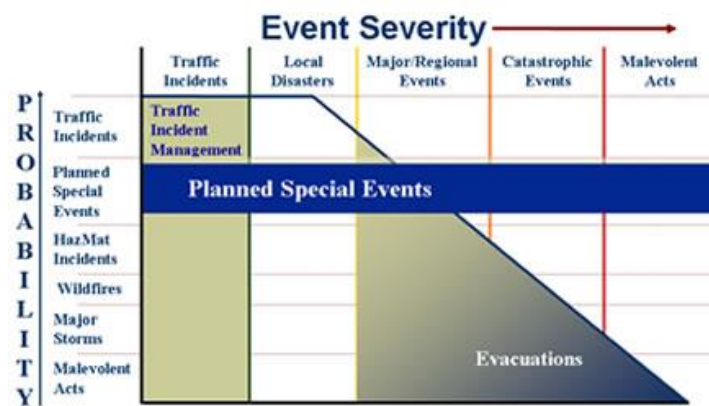
Emergency Operations Goals

- Minimize the impact of disaster on people, property, environment, and the economy.
- Assure mobility of the public and emergency response personnel.
- Assure agency continuity.
- Protect agency facilities and resources.

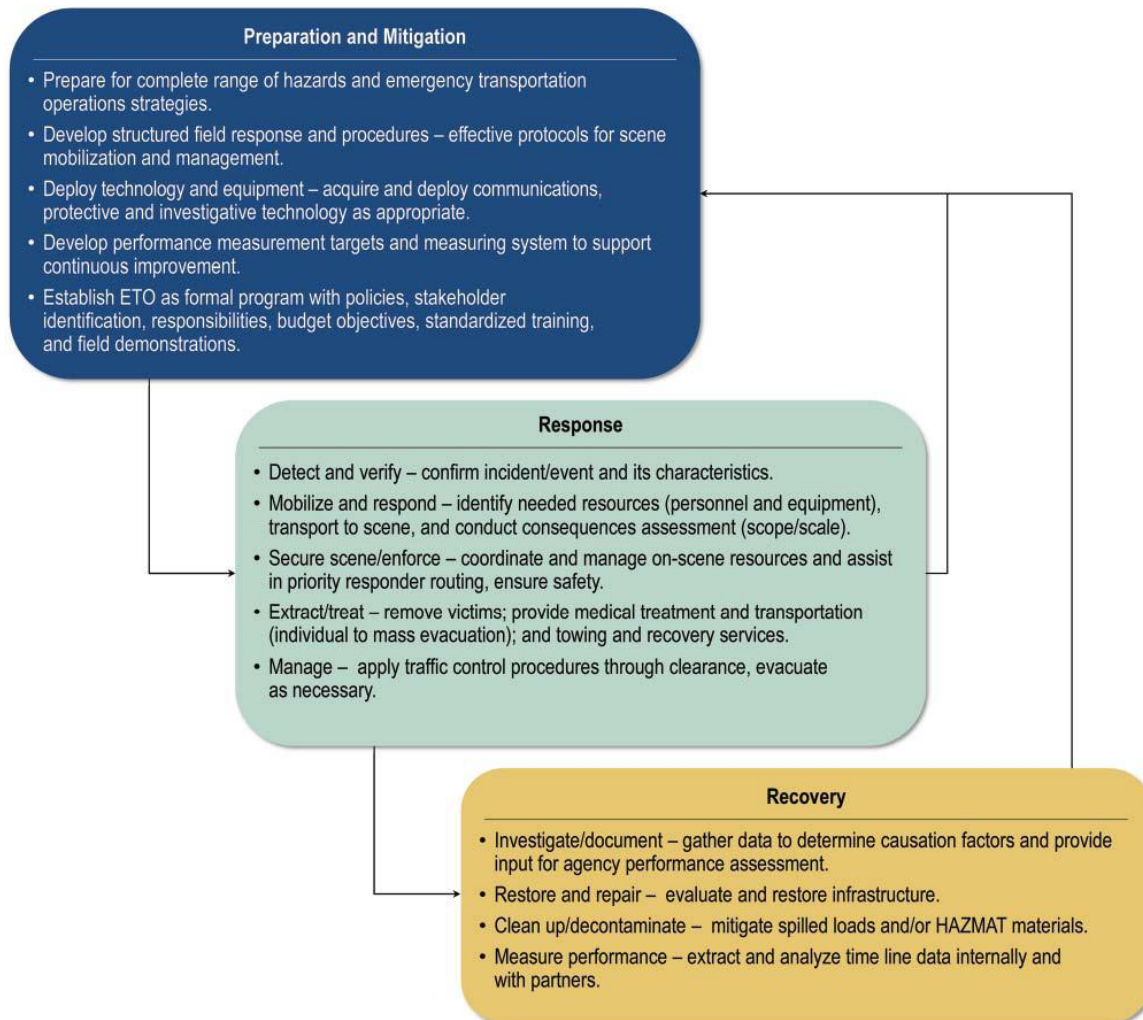


Relationship to TIM Programs

- Emergency preparedness is logically related to TIM programs
 - Emergencies and incidents will happen, but you don't know when or where
 - Planning in advance mitigates the impacts
- TIM tactics/technologies logically extend into emergency transportation operations, emergency, preparedness, and disaster response
 - Planning
 - Relationships
 - Communications



Prepare, Respond, Recover



Emergency Operations Practice Areas

- Interagency Coordination and Communication
- Policy
- Emergency Response Planning
- Threat and Vulnerability
- Emergency Operations
- Equipment
- Mutual Aid
- Notification, Awareness, and Information Sharing



We will discuss each of these in the following slides

Interagency Coordination and Communication

- Coordination and communication is key during the emergency
 - Public information coordination needs to be included
- Communications interoperability
 - Interagency communications are critical
 - Options include common radio frequencies and mobile phones
- Interagency training is important to coordination and communication



Policy

- Protection of vulnerability assessment
- Critical infrastructure protection
- Cooperation between enforcement and transportation agencies for closing roadways
 - CHP/CT Joint Operational Policy Statements
 - Streets and Highways Code – Caltrans owns infrastructure - any act necessary
 - Vehicle Code – CHP has primary investigative authority – Incident Commander
 - Natural link to TIM

Planning for Emergency Operations

- Define needs by type of emergency event
 - Consider each practice area mentioned earlier
- Define Stakeholders, Partners, and Resources
- Develop a Concept of Operations for emergency response
 - Emergency Operations Center
 - Roles and responsibilities
 - Staffing
 - Especially maintenance and operations needs
 - Relationship of transportation management center

Make Sure Your Plan Includes

- Availability and staging of resources
 - Keep in mind non-transportation resources
- Operational Strategies, including:
 - Evaluation of alternate routes and shoulder use
 - Contraflow Operations
 - Cross Over Design
 - Traffic Signal Operation
 - Suspension of work zones
 - Mobilization of contractors and equipment
- Use of public transportation
- Traveler information

Assessment is Key to Planning

- These elements are critical to successful emergency operations
 - Response times
 - Clearance times
 - Evacuation times
 - Operational strategies
- Assessment of these items can point to needed improvements



Vulnerability Assessment

- Vulnerability assessment identifies system components that may be weak spots in emergency or disaster situations
 - The process of identifying, quantifying, and prioritizing (or ranking) the vulnerabilities in a system
- Vulnerability assessments help identify critical parts of the system that should be
 - Improved (made less vulnerable)
 - Protected
 - Monitored



Emergency Response Planning and Vulnerability Assessment

- Vulnerable systems or components can compromise effective emergency response
- Emergency response planning can be a vulnerability mitigation tactic
 - If critical infrastructure fails, emergency response plans can be implemented in response
 - Emergency response planning may identify vulnerable components

Maintenance of Emergency Operations Plans

- After event de-briefing
- Routine maintenance and monitoring
- Updating emergency plans, contacts, resources
- Training Exercises
- Human factor – What if?

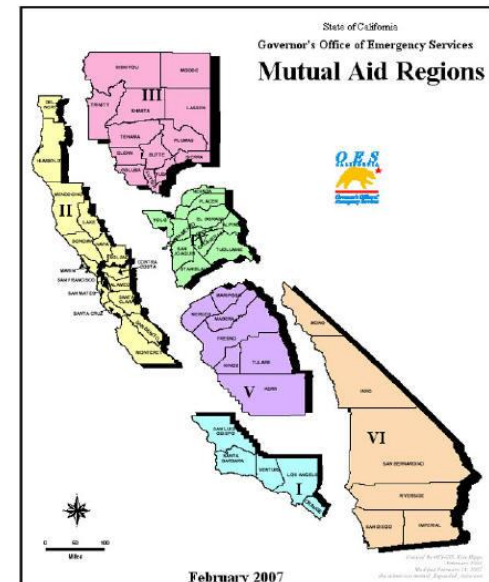


Equipment

- Equipment inventory management
 - List of resources and their location
 - Include TIM, maintenance, ITS resources
- Traffic control equipment / traffic management systems
 - TMC
 - Roadway/weather conditions (e.g. RWIS)
- Telecommunications and power
- Hazardous materials management
- Mapping and information equipment
- Emergency notification equipment

Mutual Aid

- Multi-jurisdictional agreements to provide aid across boundaries and borders
 - Caltrans Districts (D8, D12)
 - CHP Divisions (Border, Southern, Inland)
 - Counties (Riverside, Orange)
 - Arizona
 - Mexico
- Participation on tiger teams



Notification, Awareness, and Information Sharing

- Coordination and notification processes
 - Multiple means of notification
 - Media contacts / sharing info with the public
- Information sharing among response agencies
- Role of transportation agencies
 - Maintenance/Operations
 - Traveler information, public outreach, media relations
 - QuickMap, 511, CMS, HAR, Internet, Social Media
 - Emergency Alerts
 - TV, Radio, print media
 - Public information specialists



STRATEGIC HIGHWAY RESEARCH PROGRAM

Accelerating solutions for highway safety, renewal, reliability, and capacity

Planned Special Events

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

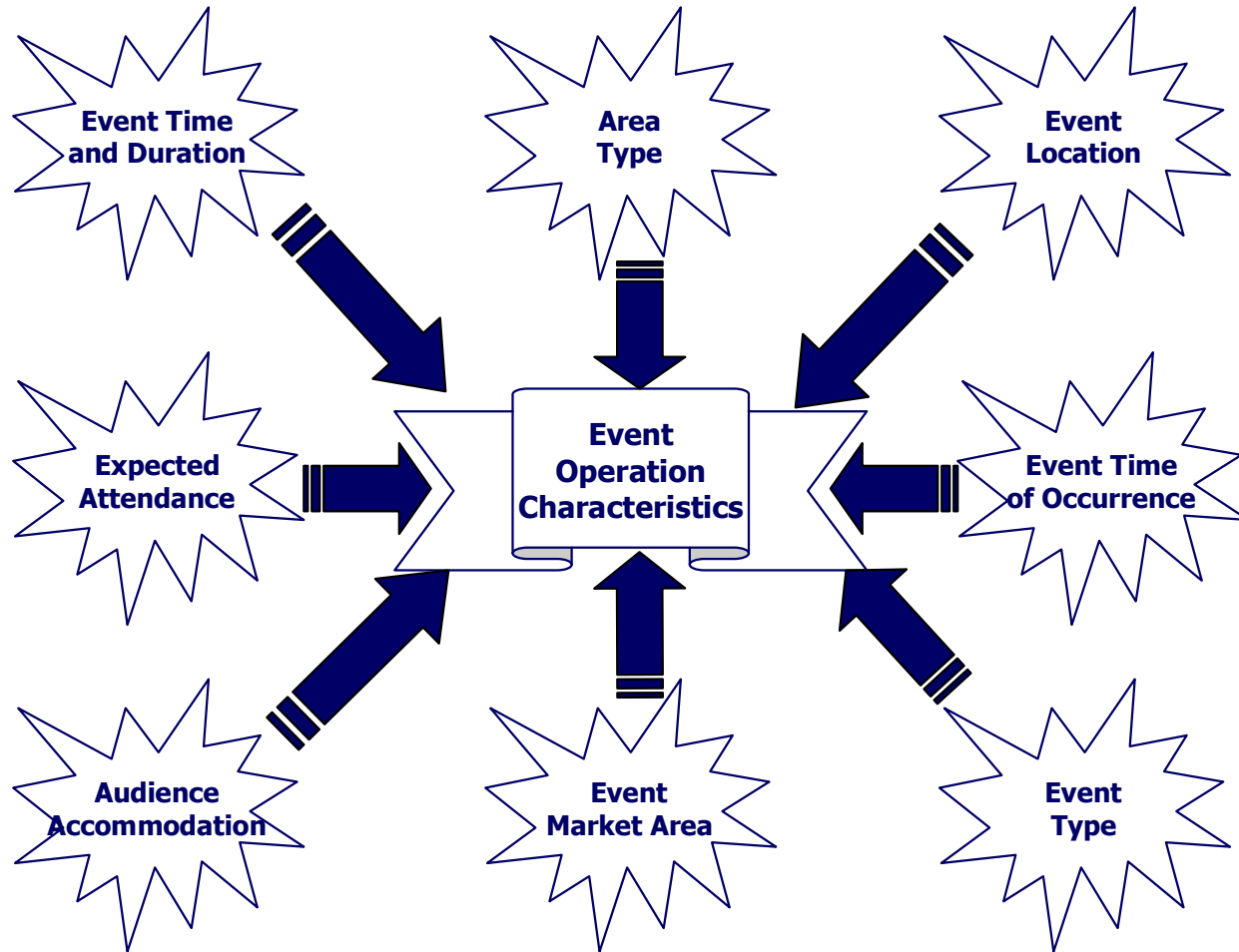
What is a Planned Special Event?

- Permanent multi-use venues
 - Sporting events
 - Concerts
 - Festivals
 - Conventions
- Less frequent public events
 - Parades
 - Fireworks displays
 - Bicycle races
 - Motorcycle rallies
 - Seasonal festivals

What are your main special events?



Operational Characteristics of Planned Special Events

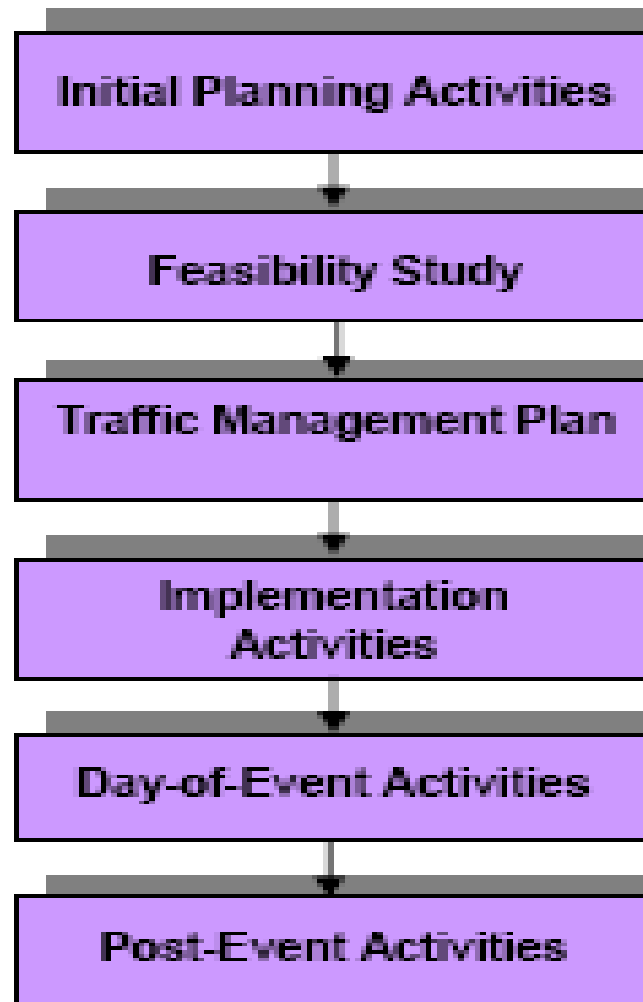


Planned Special Events and Reliability

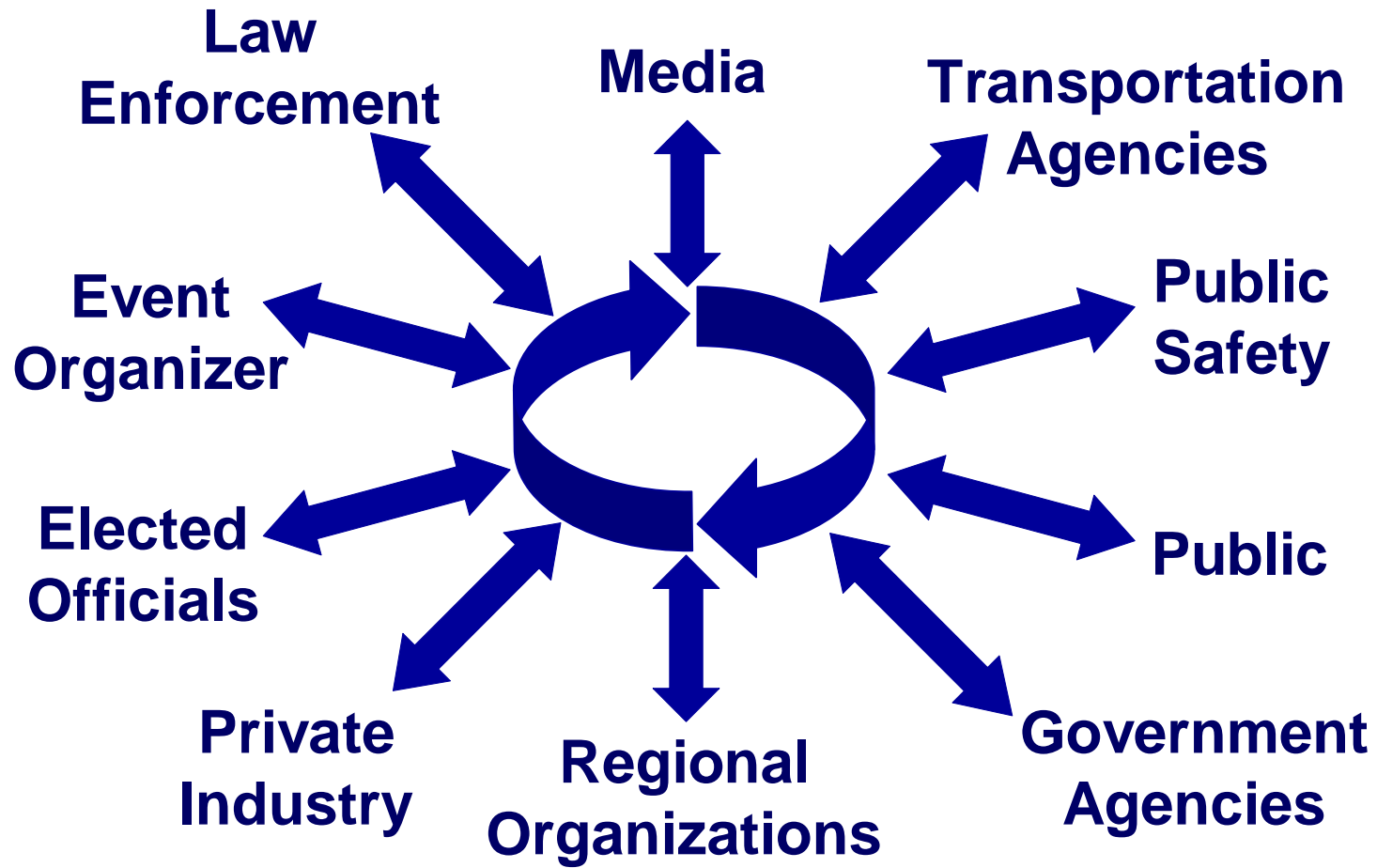
- 24,000 major planned special events
 - 600 million attendees
 - \$40 billion on “in-event” revenue
 - \$160 Billion total economic impact
- If not managed, results could be:
 - Congestion costs of \$1.7 to \$3.5 billion
 - 90 to 180 million hours of delay
 - Excess fuel consumption (64 and 128 million gallons)
- Not just event patrons are affected



Phases of Managing Travel for Planned Special Events



Meeting the Challenges: Stakeholders



National Special Security Events (NSSE)

- Designated by the Secretary of the Department of Homeland Security

» Examples:

- Presidential inaugurations
- Presidential nominating conventions
- Major sports events
- Major international meetings



NSSE Roles and Responsibilities

- For a local DOT/DPW, involvement can include:
 - Alternative transportation plan development,
 - Sidewalk garbage can removal or debris removal
 - Signal removal, roadway restriping
 - Detours and multiple street closures, partial or complete highway/freeway closures, ramp or overpass closures
 - Expedited or closed construction projects.
- Local agencies and DOTs are often taking direction from a different authority

Cost Management and Recovery for Planned Events

- Planned event management responsibilities – including costs – are spread across many agencies.
 - Challenging to quantify
 - Challenging to report
 - Challenging to recover
- Staff overtime or contracted support required to properly staff large-scale events
- Who pays?



Event Cost Management Strategies

- Know the costs for all stages of event management
 - Labor/staff resources, including overtime
 - Equipment
 - Contracted services
 - Indirect costs
- Assign costs to activities
- Identify ways to minimize costs
- Strategies for cost recovery
 - Fees/taxes
 - Grants
 - Negotiate cost sharing
 - Effective marketing



Benefits of Managing Planned Special Events

- Promote interagency coordination, resource utilization and sharing
- Incorporate new procedures, plans, and practices into day-to-day operation of agencies
- Form partnerships and build trust
- Reduce traffic congestion
- Improve mobility
- Improve travel safety



Discussion

- How do you handle special events?
- What are some lessons learned?



Recommended Resources

- Planned Special Events – Economic Role and Congestion Effects (FHWA-HOP-08-022)
- Managing Travel for Planned Special Events Handbook (FHWA-HOP-07-108)
- Planned Special Events: Cost Management and Cost Recovery Primer (FHWA-HOP-09-028)
- National Special Security Events: Transportation Planning for Planned Special Events (FHWA-HOP-11-012)

Available at

<http://www.ops.fhwa.dot.gov/publications/publications.htm#pse>



Accelerating solutions for highway safety, renewal, reliability, and capacity

Regional Operations Forum

Work Zones

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

What Are Some Challenges You Experience With Work Zones?

- How do work zones affect operation of the transportation system?**

Work Zone Challenges

- Worker & road user safety
- Work zone congestion & delay
- Roadway capacity & speed reductions
- Alternate routing & travel route availability
- Lack of coordination
- Day & night time condition awareness/visibility
- Traffic pattern changes
- Incident management

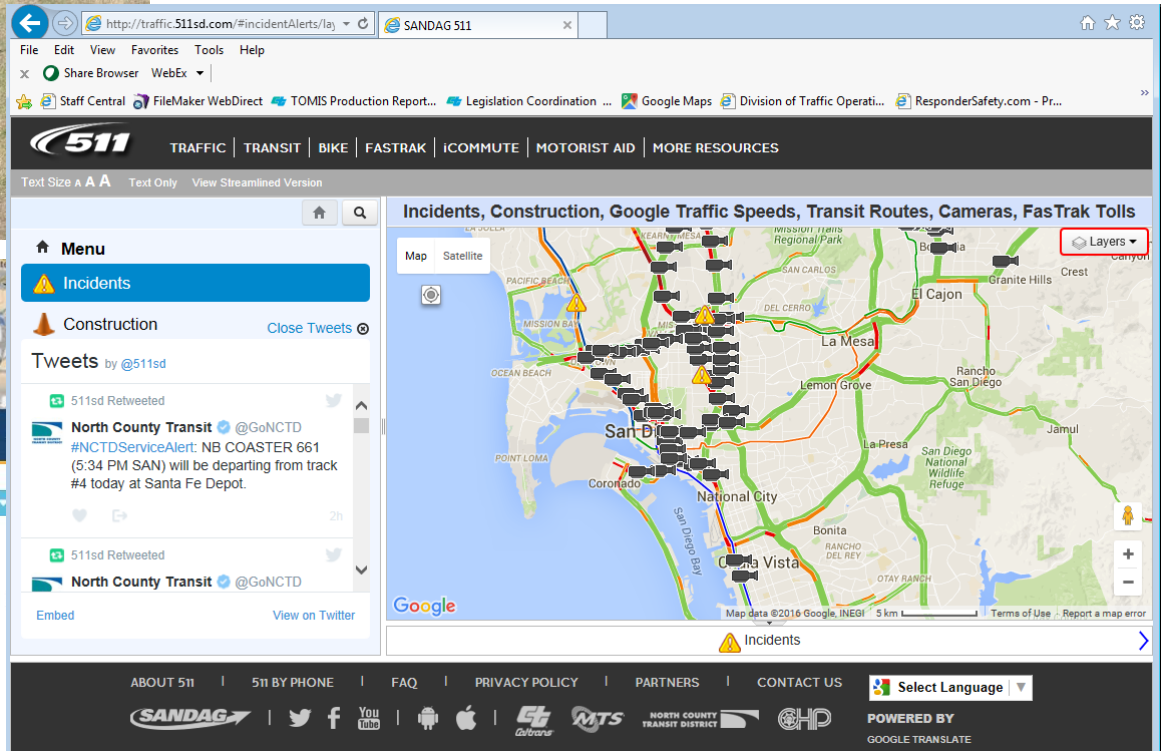
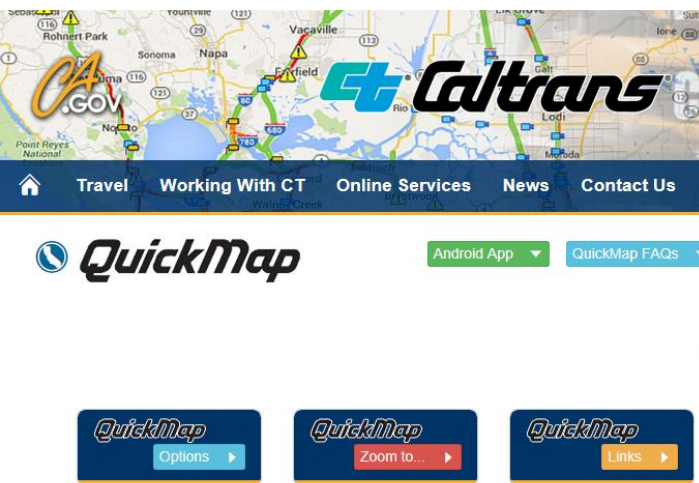
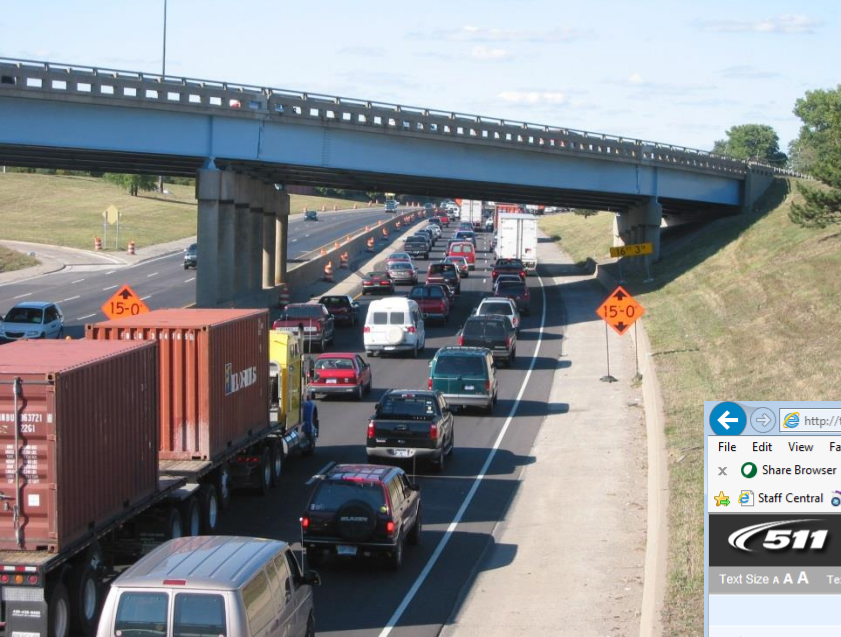


Work Zone Challenges

- Work zones are a primary cause of unexpected delays
- Drivers believe transportation agencies can better plan, schedule, and manage work zones
- Accountability of agencies and frustration of travelers are generally more intense in response to work zones
- Lane closures can increase the probability of being involved in certain types of crashes
- Reduced capacity can stress even a well-operating system



How Travelers Experience Work Zones

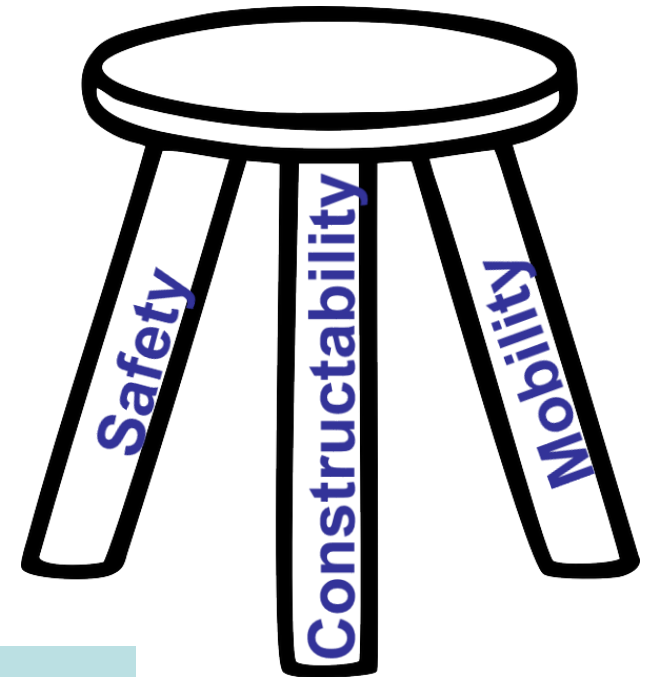


How do you Manage Work Zones?

- What to consider?
- Who's involved?
- What strategies are available?

Work Zone Management

- Need to balance:
 - Safety
 - Mobility
 - Constructability



Objective:

Achieve constructability and provide mobility without compromising safety

To a Certain Degree it Depends on the Project

- Type of Work
- Duration
- Facility Type
 - Bridge, Arterial, Highway, etc.
- Level of Expected Impacts
 - Traffic, Access, Other



What are other considerations?

Key Factors

- Federal Requirements
 - Work Zone Safety and Mobility Rule
 - MUTCD, and others
- Caltrans Policies
 - Facilitators of WZ management
 - Provide guidance/direction
 - Can encourage use of specific strategies the agency has found effective
 - Can specify processes to be followed and roles
- TMPs
- Coordination
- Planning and Execution

Transportation/Traffic Management Plan (TMP)

- How traffic will be managed during construction
- Required on ALL Federal-aid projects
- Three main components
 - Temporary Traffic Control Plan (TTCP)
 - Transportation Operations (TO) strategies
 - Public Information and Outreach (PI) strategies
- Scalable to the project
- Start early and update as needed
- Monitor during construction and adjust if needed

WZ Management Strategies

- Traffic control
- Contract incentives
- Accelerated construction
- Off-peak/night work
- Narrowed lanes
- Ramp closures
- Contraflow lanes
- Enhanced enforcement
- Freeway service patrol
- Demand management
- Traveler information
- ITS
- Signal timing adjustments
- ...and many more



TMP Development in Caltrans

- Begins during project initiation and planning
- Responsibility of 3 individuals
 - District traffic manager (DTM)
 - TMP manager
 - Construction traffic manager
- 3 levels - factors
 - Project characteristics
 - Projected delay

LEVEL OF TMP	TYPES OF CONDITIONS	TYPES OF STRATEGIES
"Blanket" TMP	<ul style="list-style-type: none">• No expected delays• Off-peak work• Low volume roads• Moving lane closures	<ul style="list-style-type: none">• Portable changeable message sign (CMS)• Freeway service patrol (FSP)• Traffic management team (TMT)• Only working in off-peak hours
"Minor" TMP (Majority of TMPs fall into this category)	<ul style="list-style-type: none">• Minimal impacts expected• Lane closure required for project• Some mitigation measures required for project	<ul style="list-style-type: none">• Only working at night• Portable and fixed CMS• Construction Zone Enhanced Enforcement Program (COZEEP) or MAZEPP for maintenance activities• TMT• Highway advisory radio
"Major" TMP (~5% of TMPs are major)	<ul style="list-style-type: none">• Significant impacts expected• Multi-jurisdictional in scope• Longer duration• Multiple contracts involved	<p>Same as for Minor TMPs plus:</p> <ul style="list-style-type: none">• Public awareness campaigns• Extended closures to expedite work• Moveable barriers to reverse lanes during peak periods• Detours• Reduced lane widths• Website

Coordination

- Within the DOT
 - Planning, Design, Construction, Traffic
- With external stakeholders
- With other projects
 - SHRP2 R11 WISE tool
 - Corridor TMPs and goals for delay
 - Mapping

New York City DOT Initiative

DOTMap



Work Zone Take Aways

- Are you familiar with Caltrans policies and the Work Zone Safety and Mobility Rule?
- Where does Operations fit in TMP development within your agency?
 - Are you involved at the right level and stage?
 - If not, who can help to get you there?
- Are there new strategies/knowledge that will benefit WZ management and operations in District 11?

Key Work Zone Resources

- Work Zone Safety and Mobility Final Rule
http://www.ops.fhwa.dot.gov/wz/resources/final_rule/language.htm
- Developing and Implementing TMPs for Work Zones
http://www.ops.fhwa.dot.gov/wz/resources/publications/trans_mgmt_plans/trans_mgmt_plans.pdf
- FHWA Work Zone Website
<http://www.ops.fhwa.dot.gov/wz/index.asp>
- National Work Zone Safety Information Clearinghouse
<http://www.workzonesafety.org>
- Freeway Management Handbook
- Work Zone Best Practices Guidebook
<http://www.ops.fhwa.dot.gov/wz/practices/best/bestpractices.htm>

Additional Work Zone Resources

- FHWA Work Zone ITS Implementation Guide
<http://www.ops.fhwa.dot.gov/publications/fhwahop14008/fhwahop14008.pdf>
- AASHTO ITS in Work Zones
<http://stsmo.transportation.org/Pages/its.aspx>
- ITS Safety and Mobility Solutions: Improving Travel Through America's Work Zones
<http://www.atssa.com/galleries/default-file/2008July21 ITS Safety and Mobility.pdf>
- Minnesota DOT Intelligent Work Zone Toolbox
<http://www.dot.state.mn.us/trafficeng/workzone/iwz/MN-IWZToolbox.pdf>
- WSDOT ATM SOP (section F covers ATM in Work Zones)
<http://www.wsdot.wa.gov/NR/rdonlyres/788B7FFC-6BE3-426A-9882-0430180900A6/0/StandardOperatingProceduresdraftv62.pdf>
- NCHRP Synthesis 379: Selection and Evaluation of Alternative Contracting Methods to Accelerate Project Completion
http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_379.pdf